What is claimed is:

[c1] A digital holographic phase-imaging method comprising the steps of:

generating a digital holographic phase map of an object at a first wavelength;

generating a digital holographic phase map of the object at a second wavelength;

subtracting the second phase map from the first phase map;

resolving the fringe number for each pixel phase value;

referencing the digital holographic phase map at the first wavelength thereby reproducing the image of the object.

[c2] The method of claim 1, wherein the step of generating a digital holographic phase map of an object at a first wavelength, further comprises:

recording a first digital hologram image of the object at the first wavelength utilizing an object beam and a reference beam;

recording a first digital object image of the object at the first wavelength utilizing an object beam;

recording a first digital reference image of the object at the first wavelength utilizing a reference beam; and

subtracting an intensity pattern of the first digital object image and an intensity pattern of the first digital reference image from the first digital hologram image resulting in a digital holographic phase map of the object at the first wavelength.

[c3] The method of claim 2, wherein an angle between the reference beam and the object beam is greater than zero, thereby producing an off-axis hologram.

[c4] The method of claim 1, wherein the step of generating a digital holographic phase map of an object at a second wavelength, further comprises:

recording a second digital hologram image of the object at the second wavelength utilizing an object beam and a reference beam;

recording a second digital object image of the object at the second wavelength utilizing an object beam;

recording a second digital reference image of the object at the second wavelength utilizing a reference beam;

subtracting an intensity pattern of the second digital object image and an intensity pattern of the second digital reference image from the second digital hologram image resulting in the digital holographic phase map of the object at the second wavelength.

[c5] The method of claim 4, wherein an angle between the reference beam and the object beam is greater than zero, thereby producing an off-axis hologram.

[c6] The method of claim 1, wherein the first wavelength and the second wavelength are within the visible range.

[c7] The method of claim 1, wherein the first wavelength and the second wavelength are within the infrared range.

[c8] The method of claim 1, wherein the first wavelength is longer than the second wavelength.

[c9] The method of claim 1, wherein the second wavelength is longer than the first wavelength.

[c10] The method of claim 1, wherein the step of referencing the digital holographic phase map at the first wavelength, thereby reproducing the image of the object further comprises, simulating a reference wave at a first wavelength incident upon the digital holographic phase map.

[c11] The method of claim 1, wherein the step of resolving the fringe number for each pixel phase value further comprises:

converting the result of the subtracting step into a plurality of distance values;

dividing each distance value by the second wavelength;

truncating the result of the dividing step;

multiplying the result of the truncating step by the second wavelength, resulting in the closest integer wavelength for each pixel value; and

adding the high resolution distance value to the closest integer wavelength for each pixel value.

[c12] The method of claim 11, further comprising:

adding π to the closest integer wavelength for each pixel value when the closest integer wavelength value is $\pi/2$ greater than the distance value; and

subtracting π from the closest integer wavelength for each pixel value when the closest integer wavelength value is $\pi/2$ less than the distance value.

[c13] A holographic phase-imaging method comprising the steps of:

recording a first hologram image at a first wavelength;

recording an first object image at a first wavelength;

recording a first reference image at a first wavelength;

generating a first phase map at a first wavelength from the recorded first hologram image, first object image and first reference image;

recording a second hologram image at a second wavelength, the second wavelength longer than the first wavelength;

recording a second object image at a second wavelength;

recording a second reference image at a second wavelength;

generating a second phase map at a second wavelength from the recorded second hologram image, second object image and second reference image;

subtracting the second phase map from the first phase map;

resolving the fringe number for each pixel phase value;

referencing the digital holographic phase map at the first wavelength; and

calculating a topographical map of the object.

[c14] The method of claim 13, wherein the step of resolving the fringe number for each pixel phase value further comprises:

converting the result of the subtracting step into a plurality of distance values;

dividing each distance value by the second wavelength;

truncating the result of the dividing step;

multiplying the result of the truncating step by the second wavelength, resulting in the closest integer wavelength for each pixel value; and

adding the high resolution distance value to the closest integer wavelength for each pixel value.

[c15] The method of claim 13, further comprising:

adding π to the closest integer wavelength for each pixel value when the closest integer wavelength value is $\pi/2$ greater than the distance value; and

subtracting π from the closest integer wavelength for each pixel value when the closest integer wavelength value is $\pi/2$ less than the distance value.

[c16] A digital holographic phase-imaging system comprising:

a digital holographic imager to provide a first hologram image, a first object image and a first reference image at a first wavelength and a second hologram image, a second object image and a second reference image at a second wavelength;

a phase map generator to receive the first hologram image, the first object image, the first reference image, the second hologram image, the second object image and the second reference image and to generate a first phase map comprising a plurality of pixels at a first wavelength and a second phase map comprising a plurality of pixels at a second wavelength;

a contour generator to determine the fringe number of the plurality of pixels of the plurality of phase maps; and

a resolution generator to produce sub-wavelength resolution of the object image.

[c17] The system of claim 16, wherein the digital holographic imager further comprises;

a first laser source to illuminate a reference mirror and a target object to generate the first hologram image, the first object image and the first reference image at the first wavelength;

a second laser source to illuminate a reference mirror and a target object to generate the second hologram image, the second object image and the second reference image at the second wavelength; and

an image capture and storage device to transmit the first hologram image, the first object image, the first reference image, the second hologram image, the second reference image and the second object image to the phase map generator.